

A. Supplementary material

Table A.1. Elongation to failure and standard deviation of elongation to failure for SSRT in Nickel based alloys under CP.

Alloy	Elongation (%)	Standard deviation (elongation)	confidence 95% (using t student) (elongation)
Nickel based alloy A	14.5	0.26	0.65±
	14.4		
	14.9		
Nickel based alloy B	9.45	4.15	6.61±
	17		
	16.2		
	9.4		
Nickel based alloy C	4.6	1.45	2.31±
	7.9		
	7.4		
	6.8		
Nickel based alloy D	5.7	0.77	6.99±
	4.6		
Nickel based alloy E	10.8	1.404	3.489±
	12.4		
	13.6		
Nickel based alloy F	12.7	0.378	0.94±
	13.4		
	13.3		

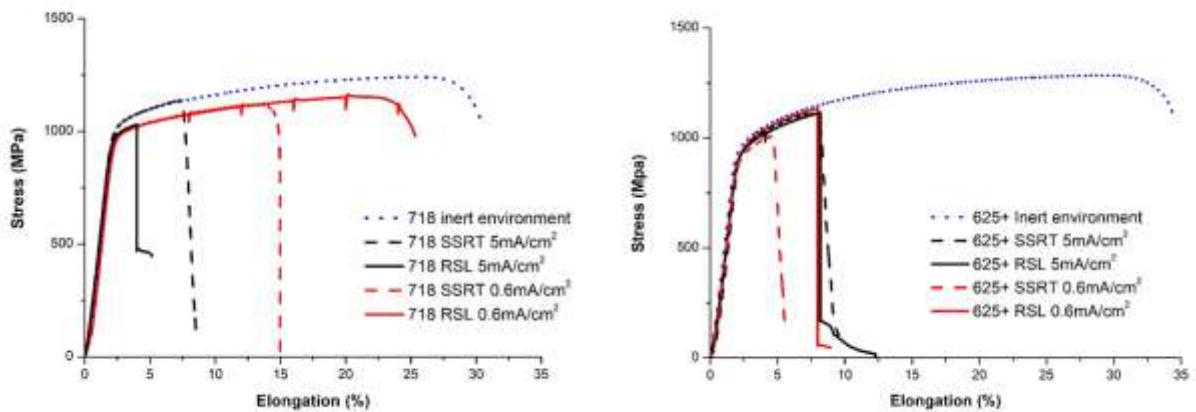


Figure A.2. Stress-elongation curves from SSRT and RSLT data for (a) alloy AR 718 and (b) 625+ in both the inert and H environments used in the TOTAL method at 5 mA/cm² and 0.6 mA/cm².

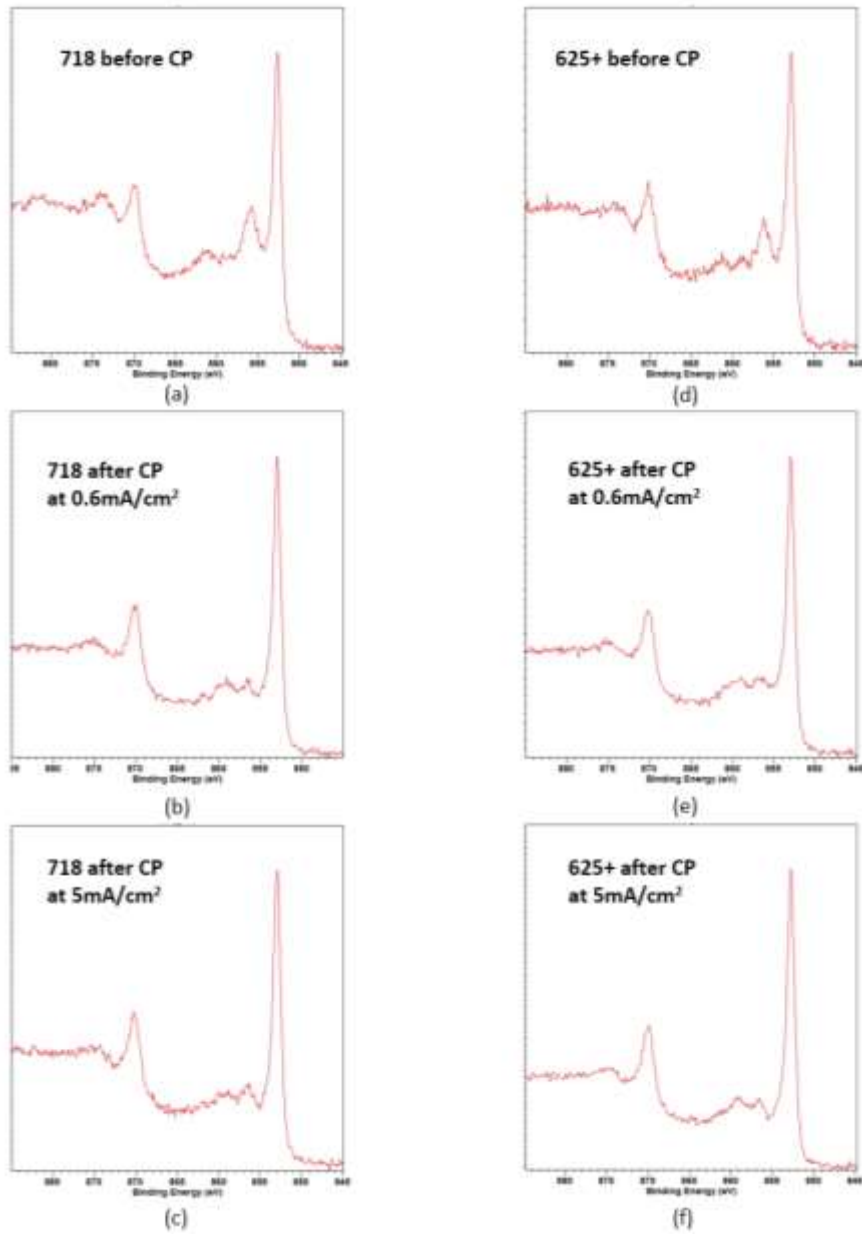


Figure A.3. High resolution Ni 2p XPS spectra taken from the surface of the 2 alloys (a) 718 before charging, (b) 718 after charging at 0.6 mA/cm^2 , (c) 718 after charging at 5 mA/cm^2 , (d) 625+ before charging, (e) 625+ after charging at 0.6 mA/cm^2 and (f) 625+ after charging at 5 mA/cm^2 .

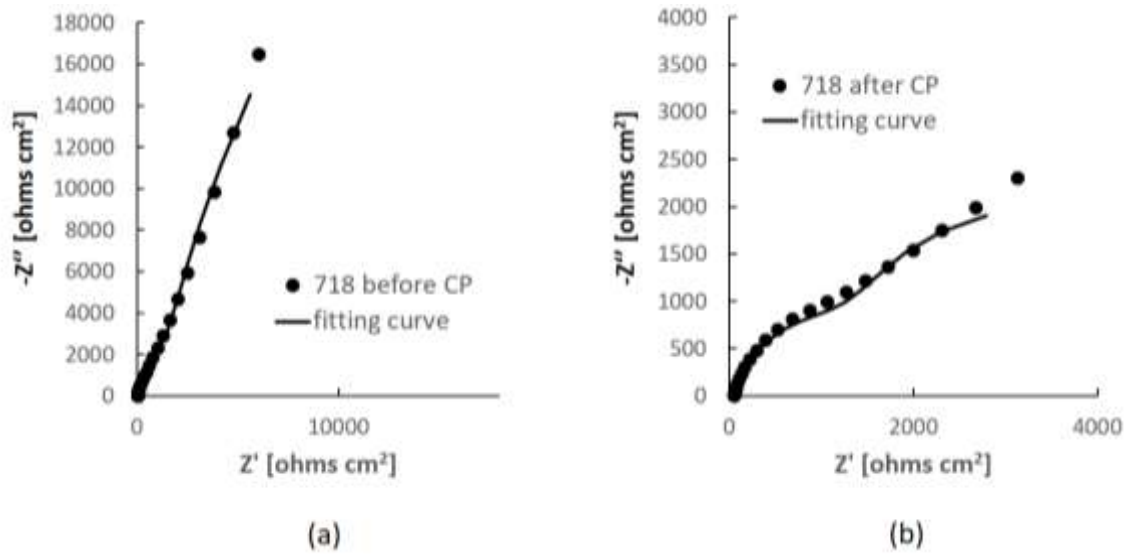


Figure A.4. Examples of the Nyquist plots for Alloy 718 (a) before and (b) after charging. Including the fitted curves used to build **table 4**.

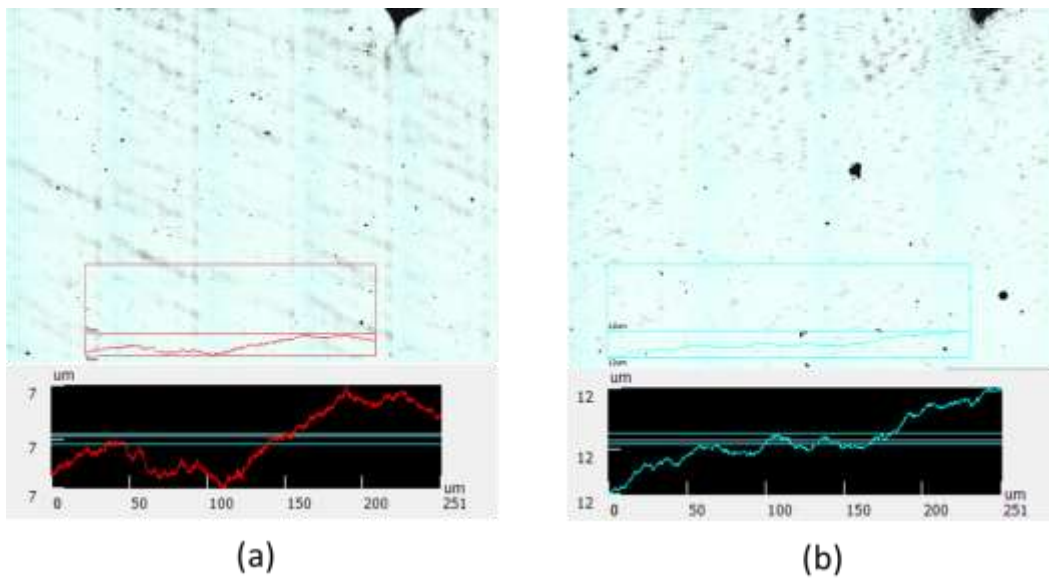
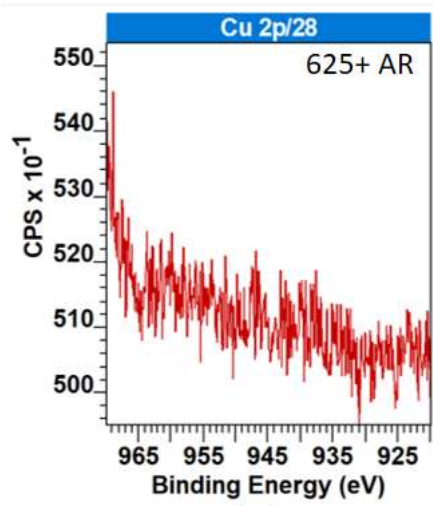
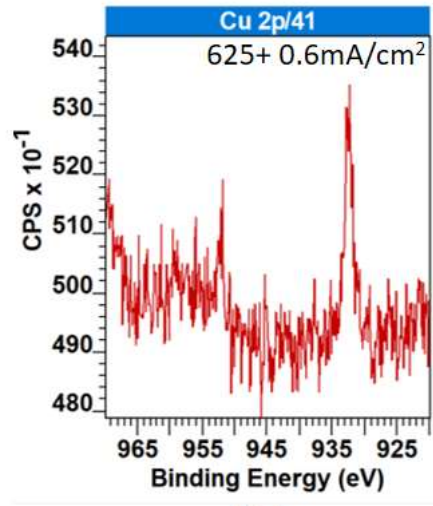


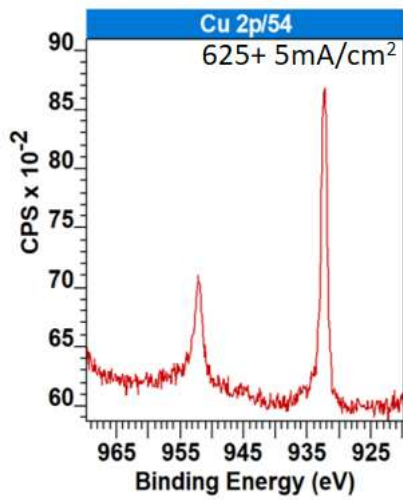
Figure A.5. Optical + Laser images obtained from a laser confocal microscope, including line profiles. It can be observed that for each line profile, the Y axis displays the same maximum and minimum value, as a result of the very flat profile. (a) Alloy 625+ before and (b) after charging in a solution of 0.5M of H_2SO_4 for 12 hours at 5 mA/cm^2 .



(a)



(b)



(c)

Figure A.6. High resolution Cu 2p XPS spectra taken from the surface of alloy 625+ (a) charging, (b) after charging at 0.6 mA/cm², (c) after charging at 5 mA/cm².